CHAPTER ONE
INTRODUCTION

1.1 Introduction

As lead agency, the U.S. Department of the Interior (DOI), Bureau of Land Management (BLM), has prepared this Environmental Impact Statement (EIS) to evaluate and disclose to the public direct, indirect and cumulative environmental impacts from continued exploration for and development of natural gas resources in the Pinedale Anticline[1] Project Area (PAPA) in Sublette County, Wyoming. Several companies, including Alpine Gas Company (Alpine), BP Amoco Production Company (BP Amoco), Anschutz Wyoming Corporation (Anschutz), HS Resources, Inc. (HS), McMurry Oil Company (McMurry), Questar Exploration & Production (Questar), Ultra Resources, Inc. (Ultra), Yates Petroleum Corporation (Yates), and others propose to explore for and develop natural gas resources in the PAPA. For purposes of this EIS, collectively these companies are referred to as the "operators". In addition, Jonah Gas Gathering Company (Jonah Gas) and Western Gas Resources (Western Gas) propose to construct gathering and trunk (sales) pipelines to deliver gas from the project area to existing gas processing plants in southwestern Wyoming.

BLM serves as the lead agency because most of the lands (80 percent) in the 308 square mile PAPA are managed by the agency (hereafter referred to as Federal lands) and the BLM has regulatory responsibility for all Federally-owned minerals in the area (about 83 percent of the PAPA minerals). The U.S. Army Corps of Engineers (COE), State of Wyoming[2] (including the Department of Environmental Quality, State Historic Preservation Office, Department of Transportation, Office of State Lands and Investments, Wyoming Oil and Gas Conservation Commission, and Game and Fish Department) and Forest Service (USFS) participated in preparation of this EIS as cooperating agencies.

When reviewing the information contained in this EIS, it is important to recognize that all but 7.4 square miles of the Federal minerals in the PAPA have been leased. Some of the Federal leases were issued in the early 1950s without environmental review and contain few, if any, measures to protect the environment. On private and state lands, the leases give the operators the right to develop minerals consistent with the conditions of the lease.

As required by the National Environmental Policy Act (NEPA) and BLM regulations, this EIS was prepared because BLM has determined that additional exploratory and development drilling on the Pinedale Anticline could cause significant adverse impacts to the human and natural environments and would exceed the reasonably foreseeable development projection for oil and gas analyzed in the BLM's Pinedale Resource Management Plan (RMP). The 1988 RMP evaluated the effects of 900 additional wells in the resource area (BLM, 1988). To date, 725 of the 900 additional wells have been drilled and are producing or have been obligated to a specific area (e.g., the Jonah II Field). Therefore, in addition to analyzing impacts from future exploration and development activities in the PAPA and construction and operation of gathering and sales pipelines, this EIS also provides analysis of a revised oil and gas reasonably foreseeable development scenario for the Pinedale RMP as part of the cumulative impact analysis (see Chapter 5).

After a number of years of little or no development, drilling activity on the Pinedale Anticline recently increased dramatically. In response to increased requests from the operators to drill wells in the project area, the BLM held meetings in March and April, 1998 with Federal, state, and local agencies, environmental groups, and the public. As a result of those meetings, the BLM's Pinedale Field Manager approved limited exploratory drilling (45 wells) in unexplored areas in Sublette County in a May 7, 1998 decision letter. The purpose of the limited drilling was to determine:

- the external limits of a potential gas reservoir on the Pinedale Anticline;
- if and where commercially developable areas of natural gas occur off the Pinedale Anticline;
- whether "pad drilling" (i.e., drilling multiple wells or bottomhole locations from a single well pad) was technically and economically feasible; and
- the nature of the geology which is essential to defining the extent of field development in the project area.

[1] An anticline is an arch of stratified rock in which layers bend downward in opposite direction from the crest.

[2] State involvement was coordinated by the Office of Federal Land Policy, State Lands and Investments.

In the May 7, 1998 decision, the BLM Pinedale Field Manager outlined the conditions of approval for the limited exploratory drilling program on Federal lands and minerals[3] prior to completion of this EIS. Drilling on non-Federal lands and minerals was not affected by BLM's decision and development can proceed unrestricted on these lands. BLM authorized limited drilling on Federal lands and minerals based on the condition that site-specific environmental analysis would be conducted for each well pad and that such analysis would be tiered to the Pinedale RMP. Generally, on Federal lands and minerals the operators were allowed to develop 14 well pads along the anticline and 31 well pads outside the anticline area prior to completion of this EIS. Additional compression associated with the exploratory drilling program on Federal lands in the Pinedale Field Office area (formerly the Pinedale Resource Area) was specifically excluded by the decision. Further, the decision letter required all new pipelines installed on Federal lands to be surface lines unless separate NEPA analysis was completed, including public involvement.

The operators have maintained that the BLM's May 7, 1998 decision requiring an EIS was premature. Their reason for this is that there is not enough information available to the operators or the BLM to accurately characterize a development scenario for the majority of the project area. The operators contend that further exploration is necessary beyond the level allowed by BLM's decision letter. BLM agrees with the operators. However, because of the sensitivity of the resources in the project area (i.e., sensitive viewsheds, crucial wildlife habitat, Native American sensitive areas, the historic Lander Trail, etc.), any drilling with its associated activities (i.e., well pads, access road construction, pipeline installation, traffic, emissions, etc.), even though exploratory in nature, has the potential to cause significant environmental impact. Under the requirements of NEPA and its implementing regulations, an EIS is required before further actions can be authorized on Federal lands and minerals.

1.2 Future Exploration and Development

The extent and nature of future development of gas reserves in the PAPA are unknown and during preparation of this EIS much debate occurred among the operators, BLM, cooperating agencies and the public about what constituted a reasonable range of alternatives for purposes of analysis. Some believe that development potential in the PAPA is enormous and that over 2,000 wells may be necessary to adequately drain all the reserves. Others believe that development potential is much more modest and essentially limited to the crest of the anticline and perhaps a few small, isolated areas away from the crest. The more modest development potential appears to be the view held by the majority of the operators as well as BLM geologists.

Obviously, with such diverse opinions regarding development potential, it has been difficult to determine what constitutes a reasonable range of alternatives for purposes of this EIS. Typically, the operators would propose for analysis a specific number of wells to be drilled over a specific time period. This operator-identified level of development would constitute a "proposed action". However, because of the uncertainties regarding the development potential of the PAPA, the operators have been unable to put forth a mutually-agreeable proposed action.

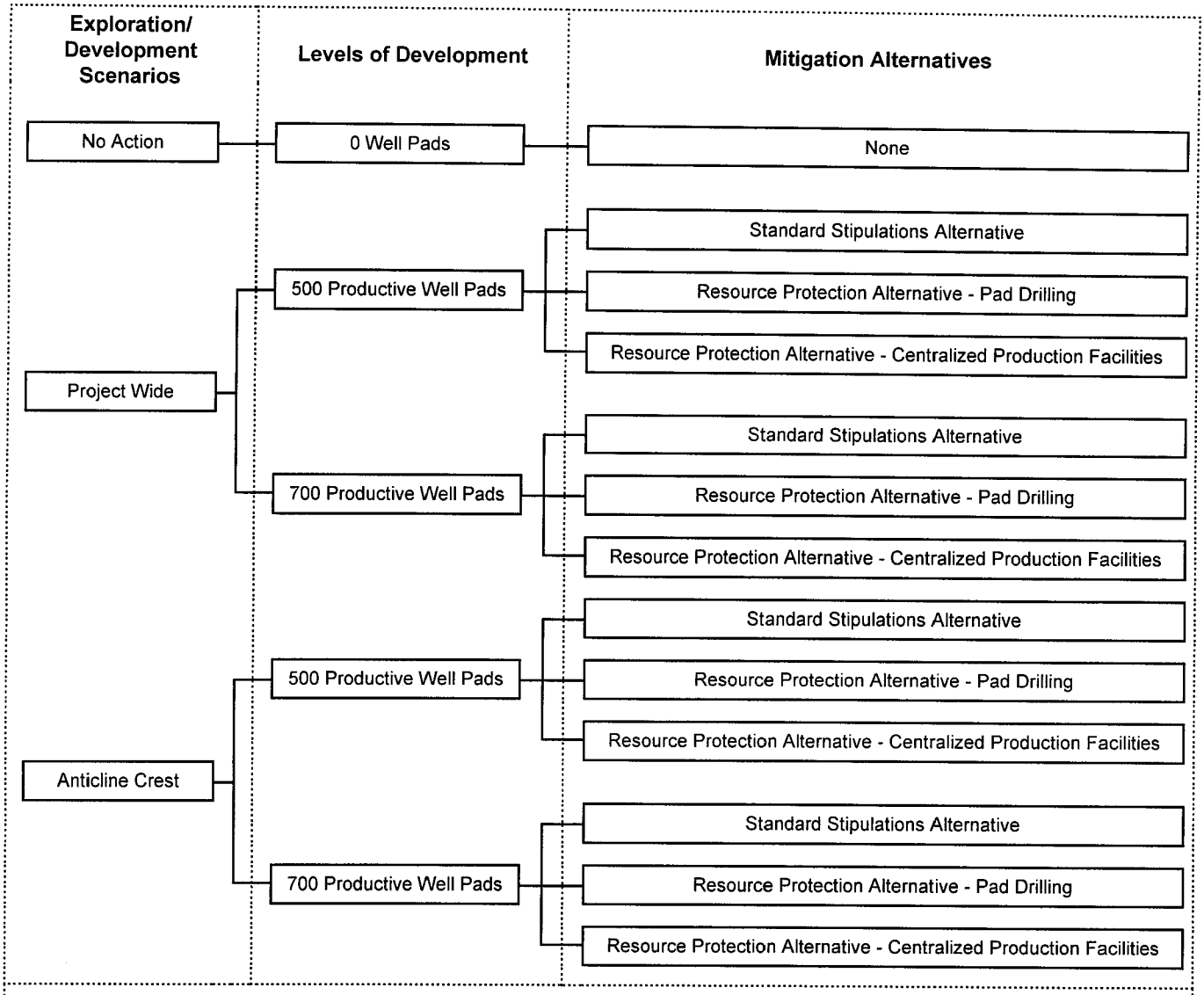
To solve this dilemma, the BLM developed an analysis matrix in consultation with the operators and cooperating agencies (see Figure 1-1). The matrix was based on 3 critical criteria which have bearing on how and to what extent development in the PAPA could proceed. These criteria, which are discussed below, include:

- 3 exploration/development scenarios which define over what portion of the PAPA (none, all or just a portion) development could occur;
- 2 levels of development which define the number of well pads (500 or 700) which could be developed in the next 10 to 15 years; and
- 2 mitigation alternatives which define options for reducing impacts to the environment from future development activities. Mitigation alternatives are evaluated based on their application on just Federal lands and minerals as well as on all lands and minerals in the PAPA (Federal, state and private).

Exploration/Development Scenarios. It is not currently known where or to what extent economically recoverable gas reserves will be discovered in the PAPA. They could be located throughout the area or isolated in just a portion of the PAPA. Both of these scenarios are addressed in this EIS. The Project Wide Exploration/Development Scenario assumes that economically recoverable reserves will be discovered

[3] For the purpose of this EIS, Federal lands and minerals consists of those parcels of lands where the Federal government owns either the surface or the mineral. In most cases, the surface and mineral owner is the same. However, there are portions of the project area where the Federal government owns the minerals under privately-owned surface. Non-Federal lands and minerals consist of parcels where the Federal government does not own either the surface or mineral estate.

Figure 1-1
Matrix Developed for the Analysis of Alternatives (1)



1 = The analysis of each exploration/development scenario, level of development and mitigation alternative includes application to Federal lands and minerals only and all lands and minerals (Federal, private and state).

throughout the project area. The Anticline Crest Exploration/Development Scenario assumes that economically recoverable reserves will be generally limited to a relatively narrow, 2-mile wide area centered on the crest of the anticline with much less development off the crest of the anticline in a few relatively small and isolated areas of economic hydrocarbon accumulations (hereafter referred to as "hot spots"). The No Action Exploration/Development Scenario is also addressed n this EIS. It assumes no further exploration or development activities would occur in the PAPA.

Results from exploratory wells drilled to date suggest that it may be more likely that development in the future will be primarily confined to the crest of the anticline and in a few hot spots rather than spread across the entire PAPA. Most wells that have proven economical to date have been drilled in very close proximity to the crest of the anticline. Wells drilled away from the anticline crest to date have been uneconomic.

Levels of Development. Perhaps the most debated question that had to be answered while preparing for this EIS was how many well pads could be reasonably expected to be developed in the PAPA in the foreseeable future? Using information provided by the operators and in consultation with the cooperating agencies, the BLM decided to analyze impacts from 2 potential levels

of development over the next 10 to 15 years - 500 and 700 productive well pads (see Figure 1-1). The analysis assumes that each well pad could contain a single well or multiple wells. To allow for dry holes, it was further assumed that it would be necessary to develop 650 and 900 well pads, respectively, to achieve 500 and 700 productive well pads (about an 80 percent success rate). Analysis contained in this document evaluates the environmental consequences of these 2 levels of development under both the Project Wide and Anticline Crest Exploration/Development scenarios discussed above.

There is disagreement among the operators about the level of development appropriate for analysis in this EIS. Ultra has insisted that development may exceed the 700 producing well pad level while McMurry has indicated that a more reasonable level of development over the next 10 to 15 years is 300 to 350 producing well pads. Based on information currently available, BLM believes that the lower estimate provided by McMurry is most likely. If McMurry is correct, the impacts from future exploration and development would be less severe than those predicted in this EIS. If Ultra is correct, additional NEPA analysis will be required before more than 700 producing well pads could be developed in the PAPA.

Another important consideration is what effect "future" oil and natural gas "pricing" will have on the number of wells drilled per year and the level of anticline development. So far in 1999, the United States and the world has experienced one of recent history's widest swings in petroleum futures pricing. Early in the year (2/99) prices were at near-record lows ($11 to $12/barrel for crude oil and $1.80/MCF for natural gas). If these prices conditions had remained for an extended period of time where the industry was operating with considerable financial loss, then PAPA development would have been very slow and conservative.

Just six or seven months later, futures prices have nearly doubled (to over $24/barrel for crude oil and over $3/MCF for natural gas). If the current price level (9/99) remains stable well into the future, then the level of interest in developing the anticline and surrounding unexplored areas will be much higher. Operators will be much more willing to risk larger portions of their exploration and development budget in the PAPA. Previously uneconomical and marginal wells will become profitable under higher product prices.

How future petroleum prices perform after the decision is issued for this project will have a direct bearing on the level of development from month-to-month and year-to-year. The level of development will vary up or down directly as the long-term oil and gas futures prices vary. Under very low, extended futures pricing, new well drilling activity in the PAPA may be as little as 10 wells per year. Under extended high price periods, more than 50 wells per year may be drilled with the total producing well numbers closer to 700 than to 300 after about 15 years.

Mitigation Alternatives. Consistent with NEPA, this EIS considers two levels of environmental protection. These different levels of protection are analyzed as mitigation alternatives for each of the exploration/ development scenarios and levels of development described above (see Figure 1-1).

The Standard Stipulations (SS) Alternative describes the minimum required level of environmental protection that would be applied to future exploration and development activities in the PAPA. In essence, the alternative incorporates environmental protection measures currently used by regulatory agencies to minimize the impacts from oil and gas development throughout most of the State of Wyoming. It is important to recognize that the environmental protection offered by this alternative is extensive. The alternative is based on current regulatory programs developed by the BLM, Wyoming Oil and Gas Conservation Commission, COE, U.S. Fish and Wildlife Service, Wyoming Department of Environmental Quality, and many others. Regulations adopted by these agencies address a wide range of potentially significant environmental impacts including hazardous wastes, ground and surface water contamination, storm water runoff, loss of wetlands, impacts to cultural resources and threatened and endangered species, and much more. As such, the alternative incorporates a myriad of measures which have proven to be very effective in reducing environmental impacts from oil and gas development.

The Resource Protection (RP) Alternative was designed to maximize the level of protection for the environment in the PAPA while still allowing development of gas resources discovered in the future. This alternative includes all of the environmental protection measures included in the SS Alternative. However, the RP Alternative recommends a number of additional mitigation measures which are specifically designed to further reduce impacts beyond current regulatory requirements or to address potential impacts that are unique to the PAPA. In most cases, this alternative recommends site-specific mitigation opportunities to reduce impacts from surface disturbing activities. However, in some cases

this alternative recommends limits on the number of well pads located in certain sensitive areas. Two options for achieving this reduced well pad density addressed in this EIS include:

- Pad Drilling; and
- Centralized Production Facilities.

As is discussed in Chapter 2, the effectiveness of these mitigation alternatives is evaluated by applying the alternatives to both: 1) only Federal lands and minerals; and 2) all lands and minerals in the PAPA.

1.3 Purpose and Need

The Mineral Leasing Act requires that all public lands, not specifically closed, be open to lease for the exploration and development of mineral resources. Nearly all of the Federal minerals within the PAPA have been leased. The purpose of this project is to continue exploration for and development of gas resources from existing Federal, state and private leases in the PAPA. From the government's standpoint, the development is necessary to produce and sell the mineral resources from which the government collects royalties paid by the operators on gas and condensate[4] produced from wells. In addition, the government desires to have the gas developed to supply ever increasing energy demands, particularly for natural gas. The operator's purpose for developing the field is to make a profit for the company and its shareholders and to provide for the country's energy needs.

It is recognized by the BLM, cooperating agencies and the operators that further exploration, coupled with concurrent development of discoveries of economically developable sources of natural gas, are necessary to allow for characterization of the development potential of the PAPA. Exploration is emphasized because the prospective geologic zones and areas with the potential for economic development have not been clearly defined. The number of new exploratory well pads authorized by BLM on May 7, 1998 was too small for adequate characterization of the gas resource on the Pinedale Anticline. However, the BLM could not allow exploratory drilling beyond the 14 new well pads because public response and BLM's evaluation of the exploratory drilling showed a concern that the drilling and associated activities could potentially result in significant adverse impacts to the human and natural environment. Under NEPA, this EIS is therefore required before further activity may occur on Federal lands.

According to the American Gas Association (AGA), natural gas consumption in the United States is expected to increase by more than 40 percent by 2015, expanding the gas share of the nation's energy market to over 28 percent[5]. This continued growth is expected from strong demand from industrial users and popularity of gas among new-home buyers and commercial customers. Significant load increases are also anticipated from new gas-fired electric generation facilities. According to AGA, electric utilities are expected to more than double their consumption of natural gas by 2015 because of economic and environmental advantages of gas-fired generation. Industrial consumers are expected to increase gas consumption by 22 percent during the same period, making the industrial sector responsible for 46 percent of overall gas consumption. During the same period, residential gas consumption is expected to grow by 25 percent. Gas is already the dominant energy source for home heating in the United States. According to AGA *"more than two of every three homes built in the United States in the past few years feature natural gas heat."*

Natural gas is a clean and efficient fossil fuel consisting mostly of methane.[6] Part of its popularity is that natural gas has far fewer emissions than coal or oil. A comparison of typical pollution emissions associated with burning one million British Thermal Units (BTUs) of natural gas and other fuels is provided on Table 1-1. Burning of natural gas, rather than coal or oil, results in a reduction of between 85 and 96 percent of the pounds of emission per million BTUs of energy.

Table 1-1
Pounds of Emissions per Million BTUs of Energy Consumed

Pollutant	Natural Gas	Oil	Coal
Carbon dioxide	115	165	210
Carbon monoxide	17	33	20
Hydrocarbons	1.4	5	23
Nitrogen oxides	100	330	834
Sulfur dioxide	0.6	1,000	1,700
Particulates	5	83	3,100

Development of new gas resources, like those proposed by the operators in the PAPA, is consistent with the Comprehensive National Energy Strategy

[4] Condensate is the liquid petroleum product associated with production of natural gas. These liquids separate from the gas when the pressure on the gas stream is reduced during production.

[5] Additional information on natural gas demand can be found on AGA's website at http://www.aga.com.

[6] A summary of the clean air benefits of burning natural gas can be found at website http://www.aga.com/cleanair.

announced by the Department of Energy in April, 1998. That strategy is designed to guide national policy toward energy security, economic expansion, and greater protection of the environment[7]. One of the goals of that strategy is to ensure against energy disruptions by increasing production of domestic sources of natural gas. The United States, until recently, has supplied all of its natural gas demands from sources within the country. Now the nation must import about 13 percent (3 trillion cubic feet) of its total yearly consumption (22 trillion cubic feet), mostly from Canada. Specific actions designed to carry out this national goal include increasing domestic natural gas production.

1.4 Regional Setting

The PAPA is located in west-central Wyoming in Sublette County (see Figure 1-2). The town of Pinedale is situated on the northern end of the project area. Pinedale is located approximately 80 highway miles south of Jackson Hole and 100 miles north of Rock Springs. Other communities/settlements in the general vicinity of the project area include Cora, Daniel, Boulder, Bargerville, Marbleton and Big Piney.

Generally, the PAPA lies between U.S. Highway 191 and the Green River. The project area is dominated by sagebrush and high desert vegetation blending with riparian areas and wetlands associated with the New Fork and Green River flood plains. The sagebrush covered higher elevation area between the rivers in the northern half of the PAPA is known locally as the "Mesa".

U.S. Highway 191 is the primary access to the project area and generally runs along the eastern and northern edges of the PAPA. It is a primary route for tourist travel to Yellowstone and Teton National Parks and Jackson Hole. U.S. Highway 189 runs west of the PAPA and State Highway 351 crosses through the southern portion of the project area (see Figure 1-2). Although no national forest lands are located in the project area, the Bridger-Teton National Forest is located west, north and east of the PAPA. At their closest, national forest lands are approximately 2.3 miles from the northern boundary of the project area at Fremont Lake.

1.5 National Environmental Policy Act

This EIS was prepared pursuant to the National Environmental Policy Act of 1969 and subsequent regulations adopted by the Council on Environmental Quality (49 CFR 1500). NEPA establishes a national environmental policy and is the basic national charter for protection of the environment [40 CFR 1500.1(a)].

NEPA's stated purpose is to "*declare a national policy that will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man*". NEPA involves a procedure that helps public officials take actions that protect, restore, and enhance the environment. To comply with NEPA, Federal agencies must "*use all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment.*" Specifically, NEPA requires Federal agencies to:

- act as an environmental trustee for future generations;
- assure healthful, productive and aesthetically and culturally pleasing surroundings;
- attain the widest possible range of beneficial uses of the environment without degradation or risk to health and safety;
- preserve historic and cultural heritage and individual opportunity for choice;
- achieve a balance between population and resource use; and
- enhance the quality of renewable resources and encourage the recycling of depletable resources.

This EIS is intended to be a public document that analyzes the probable and known environmental impacts upon components of the human and natural environment from alternatives for continued exploration for and development of gas resources in the PAPA. The goal of this EIS is to produce better decisions using 3 themes developed in the Council on Environmental Quality (CEQ) regulations: 1) early and continuous communication with the public; 2) early consideration of significant environmental consequences; and 3) consideration of all reasonable alternatives.

In addition to the direct impacts, several agencies, environmental groups and individuals have raised concerns regarding cumulative impacts from industrial development in western Wyoming. Some have commented that the once undeveloped landscape is becoming "industrialized". These types of comments

[7] Select cnes.htm at http://198.124.130.244/news/speeches98/febss/ for a summary of goals of the National Energy Strategy.

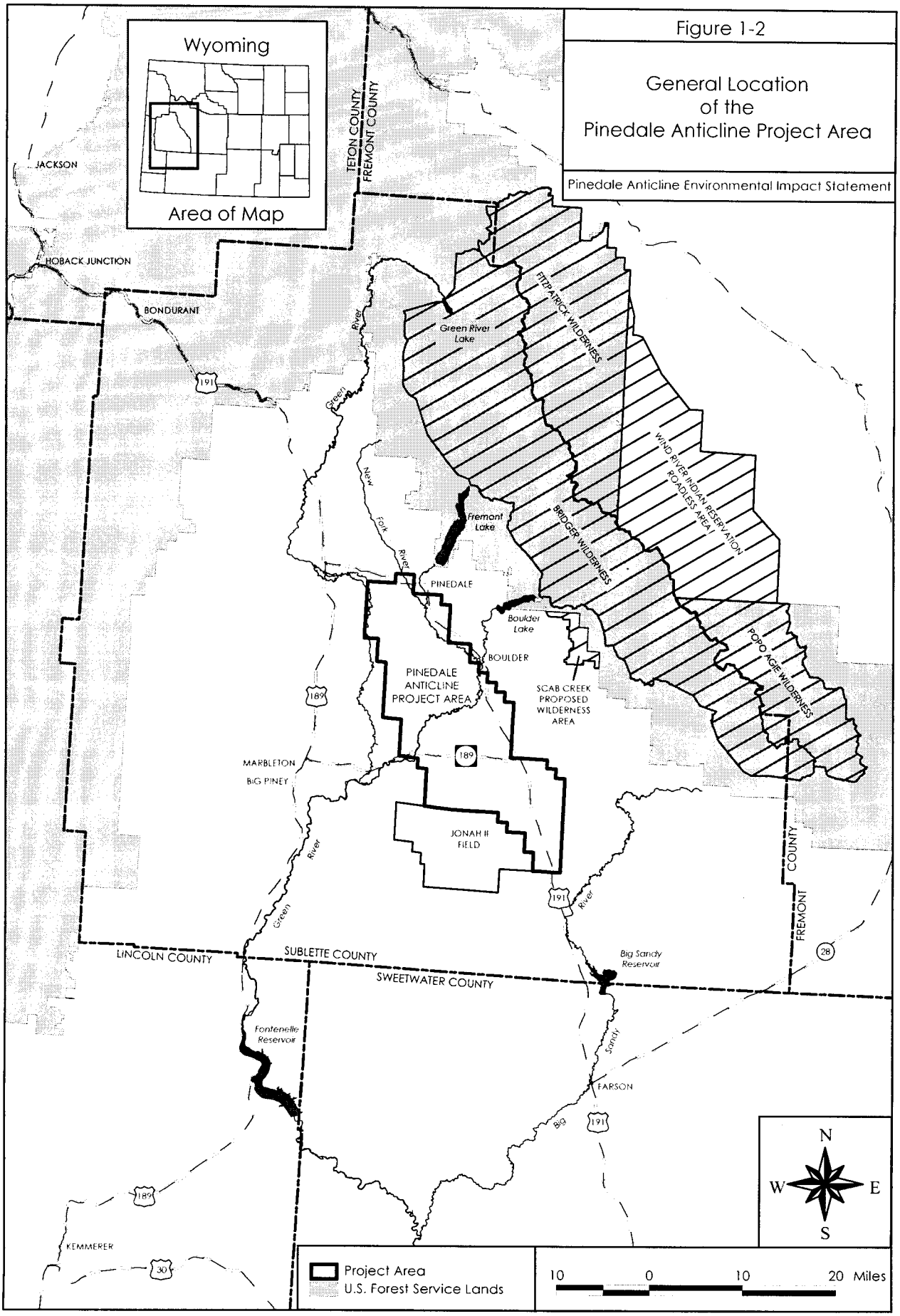


Figure 1-2
General Location
of the
Pinedale Anticline Project Area
Pinedale Anticline Environmental Impact Statement
Wyoming
Area of Map
JACKSON
HOBACK JUNCTION
BONDURANT
TETON COUNTY
FREMONT COUNTY
191
Green River
Green River Lake
FITZPATRICK WILDERNESS
WIND RIVER INDIAN RESERVATION
ROADLESS AREA
BRIDGER WILDERNESS
New Fork River
Fremont Lake
PINEDALE
Boulder Lake
BOULDER
PINEDALE ANTICLINE PROJECT AREA
SCAB CREEK PROPOSED WILDERNESS AREA
POPO AGIE WILDERNESS
189
MARBLETON
BIG PINEY
JONAH II FIELD
Green River
191
FREMONT COUNTY
28
LINCOLN COUNTY
SUBLETTE COUNTY
SWEETWATER COUNTY
Big Sandy Reservoir
Fontenelle Reservoir
Big Sandy
FARSON
191
189
KEMMERER
30
N
W
E
S
Project Area
U.S. Forest Service Lands
10 0 10 20 Miles

point to the importance of adequately addressing cumulative impacts in this EIS (see Chapter 5).

During the past two decades, the BLM has prepared a number of NEPA documents in southwestern Wyoming. Most of these documents addressed proposals to develop oil and gas resources. Chapter 5 of this EIS incorporates the quantitative impact assessments for these other projects and provides a reasonable projection of cumulative impacts to important resources across a relatively large geographic area. Where available, updates of the status of other projects are included in Chapter 5.

Of particular relevance is the recently completed EIS for the Jonah II Field (BLM, 1997a). The Jonah Project developed many of the production technologies which will be used in the PAPA. Because the Jonah II Project Area is contiguous with the PAPA (see Figure 1-2) and development techniques will be similar, reference to the Jonah II EIS is frequent and cumulative impact assessment is particularly relevant.

This EIS was prepared using the recommendations submitted to the Secretary of the Interior by the Green River Basin Advisory Committee (GRBAC). The primary goal of the GRBAC was to ensure reasonable development of gas resources on Federal lands and minerals while protecting environmental and other resource values. One of the important steps in achieving this goal was to improve NEPA documentation and analysis while reducing delays, uncertainty and increased costs associated with the NEPA process. Specific questions regarding implementation of GRBAC's recommendations should be directed to the BLM's project manager or Pinedale Field Manager.

1.6 Scoping, Consultation and Coordination

CEQ regulations require that agencies responsible for preparing an EIS use an early scoping process to identify significant issues. Early and improved scoping was emphasized by GRBAC. The principal goals of the scoping process are to allow public participation and to identify issues, concerns and potential impacts that require detailed analysis in the EIS. The scoping process was the primary mechanism used by BLM to identify public interests and concerns about proposed development activities in the PAPA.

BLM has actively and directly solicited public involvement by circulating information through mailings, public announcements, and notices in local newspapers and through a series of public workshops. The public has been provided ample opportunity to submit comments and recommendations by mail, over the telephone or fax, e-mail, or in person. The BLM did not only accumulate significant public comment, the agency considered and responded to the concerns expressed. Those concerns lead directly to the development of the scope of this EIS. A chronology of the public scoping process used by the BLM for this project is provided in Table 1-2.

A notice of intent to conduct public scoping and prepare an EIS was published on July 14, 1998 in the *Federal Register*. On July 9, 1998, BLM mailed a scoping statement to the media, governmental agencies, environmental organizations, industry representatives, individuals, landowners and grazing permittees. The scoping statement explained the general nature of the project and requested initial comments concerning the level of analysis to be included in this document. The formal public scoping comment period ended in August, 1998.

Meetings were held with interested members of the public on July 14, 1998 to discuss issues associated with transportation planning and grazing. The public was invited to attend a tour of the PAPA on July 23, 1998. The tour included stops at a number of important areas in the PAPA including sensitive viewsheds, the Lander Trail, reclaimed well sites, existing producing well pads, etc. At each of these stops discussions were held with the attending public and concerns noted. On the evening of July 23, 1998 a public hearing was held in Pinedale. Six agency scoping meetings were held, including two meetings designed to allow agency participation in determining the geographic extent of the cumulative impact analysis for each resource. A meeting was held with environmental groups on June 18, 1999 to discuss the revised mitigation alternatives and levels of development.

Public involvement was also solicited at a series of workshops held in Pinedale during the week of December 7, 1998 and again on August 5, 1999. At these workshops the public was presented with descriptions of the various scenarios for continued exploration and development of the gas resource and the tools which would be used by BLM to assess and quantify the impacts associated with the alternatives (i.e., visual simulations, models to predict degradation of habitat suitability, etc.). Preliminary descriptions of the alternatives were provided at the December workshops and the public identified additional concerns. During the August open house/workshop, additional

Table 1-2
Chronology of Public Scoping for the Pinedale Anticline Environmental Impact Statement

Date	Scoping Purpose
May 7, 1998	BLM decision issued following agency, environmental group, and public input to restrict exploratory drilling to 45 wells (14 on the anticline and 31 outside the anticline area). No further drilling until an EIS is prepared on exploration and development and the Pinedale Resource Management Plan oil and gas reasonable foreseeable development analysis is updated.
July 9, 1998	Scoping initiated for EIS. Scoping notice mailed to over 600 individuals, environmental groups, and Federal, state, and local agencies.
July 14, 1998	*Federal Register* Notice of Intent to prepare EIS published. Transportation planning and grazing meeting held in Pinedale, Wyoming.
July 23, 1998	Public tour of the project area (50 public attendees). Public scoping meeting held in Pinedale, Wyoming to receive input on issues, concerns, alternatives, and mitigation opportunities that BLM should address in the EIS (40 public attendees).
July 31, 1998	Federal, state, local agency scoping meeting held in Pinedale to receive input on issues, concerns, alternatives, and mitigation opportunities that BLM should address in the EIS (8 agency representatives).
August 6, 1998	Agency scoping meeting in Cheyenne, Wyoming. Federal and state agency scoping meeting held to receive input on issues, concerns, alternatives, and mitigation opportunities that BLM should address in the EIS (15 agency representatives).
August 13-14, 1998	Cumulative impact analysis area definition/delineation for each of the affected resources reviewed with Federal, state and local agencies in Pinedale.
August 26, 1998	Cumulative impact analysis area definition/delineation for each of the affected resources reviewed with Federal and state agencies in Cheyenne.
August 27, 1998	Air quality meeting with the Environmental Protection Agency, Wyoming Department of Environmental Quality, and USFS to review proposal for analyzing field development impacts to air quality and Air Quality-Related Values in Cheyenne.
September 3, 1998	BLM/operator meeting to prepare preliminary description of various development scenarios in Pinedale.
December 7-10, 1998	Agency, environmental group, and public workshops to present and receive input on the development alternatives to be analyzed in the EIS in Pinedale. Workshop addressed each resource (wildlife, air quality, visual, water quality, recreation, transportation planning, cultural, Native American, etc.).
January 14, 1999	Scoping meeting with state agencies.
March 25 – May 21, 1999	Operator identification of a second level of development (500 producing well locations) and mitigation alternative (centralized production facilities) for analysis in the EIS.
June 17, 1999	Cooperating agencies briefing in Cheyenne on the additional level of development and mitigation alternative.
June 18, 1999	Environmental groups (Wyoming Outdoor Council, Greater Yellowstone Coalition, Wyoming Wildlife Federation) briefing in Lander on the additional level of development and mitigation alternative.
August 5, 1999	Public workshops to present an update of the EIS and to review additional level of development and mitigation alternative in Pinedale.
August 6, 1999	Transportation planning meeting with general public, livestock operators, cooperating agencies, landowners, county and local government entities, and oil/gas operators to identify access into and within the Pinedale Anticline Field.
August 18, 1999	Pinedale City Council meeting - discussed Pinedale resident's concern regarding public safety, dust, deteriorating road conditions, etc. due to oil/gas operator traffic through the Town of Pinedale, particularly traffic on Tyler Avenue to access the north end of the anticline. Discussed alternative routes of access to the anticline.
October 5, 1999	Sublette County Commissioners meeting to discuss transportation planning.
November, 1999	Draft EIS distributed for agency, environmental group and public review and comment (60 day review). *Federal Register* Notice of Availability of Draft EIS published.

refinement of the mitigation alternatives was described to the public. Approximately 90 members of the public attended the workshops in December, 1998 and about 24 attended the August, 1999 open house/workshop. A transportation planning workshop was also held in August during which approximately 27 people attended. The meeting was attended by general public, livestock operators, cooperating agencies, landowners, county and local government entities, and oil/gas operators to identify access into and within the Pinedale Anticline Field.

All comments received were incorporated into the analysis of issues found in this EIS. Over 100 comment letters were received during the scoping process and are available for inspection in the BLM's Pinedale and Rock Springs Field Offices. Issues raised by the public are summarized in the impact analysis discussion for each resource in Chapter 4.

1.7 Authorizing Actions and Relationships to Statutes and Regulations

A list of permits, approvals and authorizing actions necessary to construct, operate, maintain and abandon project-related facilities is provided in Table 1-3.

1.7.1 Federal Permits. Drilling of Federal minerals is subject to BLM's Onshore Oil and Gas Order No. 1 (43 CFR 3164)[8]. The operator's drilling programs would require BLM approval for each new well and well pad on Federal lands or involving Federal minerals prior to commencement of drilling. BLM review of the drilling program would be accomplished through the Application for Permit to Drill (APD) process. BLM Onshore Order No. 1 requires an applicant to comply with the following:

- operations must result in diligent development and efficient recovery of resources;
- all activities must comply with applicable Federal laws and regulations and with state and local laws and regulations to the extent that such state and local laws are applicable to Federal leases;
- all activities must contain adequate safeguards to protect the environment;
- disturbed lands must be properly reclaimed;
- underground sources of fresh water must be protected from fluid injection operations; and
- all activities must protect public health and safety.

Onshore Order No. 1 specifically states that "*lessees and operators shall be held fully accountable for their contractor's and subcontractor's compliance with the requirements of the approved permit and/or plan*".

Pipeline and road rights-of-way and Temporary Use Permits (TUPs) on Federal lands would be issued under the authority of the Mineral Leasing Act of 1920 (MLA) or Federal Land Policy and Management Act of 1976 (FLPMA). The right-of-way grant authorizing construction of ancillary facilities, access roads and pipelines would grant the operators certain rights subject to the terms and conditions incorporated by the BLM into the grant.

Any area potentially affected by surface disturbing activities that contain cultural resources, Native American sacred sites or objects, or provide potential habitat for Federal threatened or endangered species are protected by the National Historic Preservation Act of 1966, Native American Graves Protection and Repatriation Act, and the Endangered Species Act of 1973, respectively.

[8] BLM's Onshore Oil and Gas Orders and 43 CFR Part 3160 are available at http://www.mt.blm.gov/oilgas/operation/index.html

Two Presidential Executive Orders (EOs) may affect implementation of the project. The EOs place restrictions on government approval of construction activities in flood plains and wetlands and are binding on all governmental agencies. The EOs require consideration of wetland and flood plain impacts in all documents prepared in compliance with NEPA. EO 11988 was designed to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare and to restore and preserve the natural and beneficial values of flood plains. The EO defines a flood plain as the "*lowland and relatively flat areas adjoining inland and coastal waters ... including at a minimum, that area subject to a one percent or greater chance of flooding in any given year*" (Codification of Presidential Proclamations and Executive Orders).

In compliance with this EO, BLM would avoid placement of any well pads in 100-year flood plains on Federal lands and minerals. However, there are no restrictions on placing well pads in 100-year flood plains on non-Federal lands and minerals in the project area.

EO 11990 was designed, to the extent possible, to avoid the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct and indirect support of new construction in wetlands wherever there is a practicable alternative. BLM would avoid placement of well pads within 500 feet of wetlands and riparian areas on Federal lands and minerals.

1.7.2 Corps of Engineers Permits. The COE regulates the discharge of dredged or fill materials into waters of the United States, including streams, lakes, and wetlands, pursuant to Section 404 of the Federal Clean Water Act (33 USC 1344) in accordance with COE rules and regulations (33 CFR 320-330). The discharge must also comply with the U.S. Environmental Protection Agency's (EPA) Section 404(b)(1) guidelines (40 CFR 230).

In most cases, construction of roads, well pads, pipelines, and reservoirs can be authorized under general permits. A standard (individual) permit would be required for those activities that exceed general permit criteria. Operators would be required to demonstrate that impacts to special aquatic sites, including wetlands, have been avoided and minimized to the maximum extent practicable before the COE could issue an individual permit. During scoping the COE expressed concern about the filling of palustrine scrub-shrub and forested wetlands, particularly in riparian areas, and all permit

Table 1-3
Federal, State and Local Permits, Approvals and Authorizing Actions Necessary for Construction, Operation, Maintenance and Abandonment of the Alternatives (1)

Issuing Agency/Permit Name	Nature of Permit/Approval	Authority
Bureau of Land Management Permit to Drill, Deepen or Plug Back (APD/Sundry process)	Controls drilling for oil and gas on Federal onshore lands	Mineral Leasing Act of 1920 (30 U.S.C. 181 *et seq.*); 43 CFR 3162
Rights-of-way Grants and Temporary Use Permits	Right-of-way grants on Federal lands	Mineral Leasing Act of 1920 as amended (30 U.S.C. 185); 43 CFR 2880
Rights-of-way Grants and Temporary Use Permits	Right-of-way grants on Federal lands	Federal Land Policy and Management Act of 1976 (43 U.S.C. 1761 - 1771); 43 CFR 2800
Antiquities, Cultural and Historic Resource Permits	Issue antiquities and cultural resources use permits to inventory, excavate or remove cultural or historic resources from Federal lands	Antiquities Act of 1906 (16 U.S.C. Section 431-433); Archaeological Resources Public Protection Act of 1979 (16 U.S.C. Sections 470aa - 47011); 43 CFR Part 3; Section 106 of the National Historic Preservation Act.
Approval to Dispose of Produced Water	Controls disposal of produced water from Federal leases	Mineral Leasing Act of 1920 (30 U.S.C. 181 *et seq.*); 43 CFR 3164; Onshore Oil and Gas Order No. 7
U.S. Army Corps of Engineers Section 404 Permit (Nationwide and Individual)	Controls discharge of dredged or fill materials into waters of the United States.	Section 404 of the Clean Water Act of 1972 (33 USC 1344)
U.S. Fish and Wildlife Service Consultation Process, Endangered and Threatened Species	Biological Assessment	Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. *et seq.*)
Wyoming Department of Environmental Quality Water Quality Division Notice of Intent - Storm Water Discharge Permit Temporary Discharge Permits	Controls off-site storm water runoff from construction activities resulting in 5 acres or more of disturbance	Wyoming Environmental Quality Act; Section 405 of the Clean Water Act (40 CFR Parts 122, 123 and 124); WDEQ Water Quality Rules and Regulations, Chapter 18
Air Quality Division Permits to construct and operate Notice of Installation	Regulates emissions from project components Notification of Potential Emissions from production equipment	Wyoming Air Quality Standards and Regulations WDEQ Rules and Regulations
Wyoming Department of Transportation Oversize and Overlength Load Permits Utility Permit Access Permit	 Permits for oversize, overlength and overweight loads Highway pipeline crossing Highway access construction	Chapters 17 and 20 of the Wyoming Department of Transportation Rules and Regulations Title 12: Code of Civil Procedures, Chapter 26: Eminent Domain Rules and Regulations for Access Driveways as Approved by the Wyoming Highway Commission
Wyoming Oil and Gas Conservation Commission Permit to Drill, Deepen or Plug Back (APD process)	Regulates drilling of all oil and gas wells in the state	Wyoming Oil and Gas Conservation Commission Regulations (Section III; Rule 305)
Rule 302	Regulates down hole spacing of all oil and gas wells	Wyoming Oil and Gas Conservation Commission Regulations (Section III; Rule 302)
Change in Depletion Plans	Regulates drilling of additional wells	Wyoming Oil and Gas Act (W.S. 30-5-110)
Application for Permit to Use Earthen Pit	Regulates reserve pits on drilling locations	Wyoming Oil and Gas Conservation Commission Regulations (Section III; Rule 326)
Plugging and Abandonment of a Well	Establishes procedures for permanently abandoning a well	Wyoming Oil and Gas Conservation Commission Regulations (Section III; Rule 315)
Wyoming State Engineer's Office Water Well Permit	Grant permit to appropriate groundwater	W.S. 41-121 through 147

Table 1-3. Concluded

Issuing Agency/Permit Name	Nature of Permit/Approval	Authority
Wyoming State Lands and Investments	Right-of-way and easements on state lands	W.S. 36-9-118
Sublette County Planning and Zoning	Energy Pipeline Permit	
Planning and Zoning	Driveway Permit	

1 = This list is intended to provide only an overview of key regulatory requirements that would govern project implementation. Additional approvals, permits and authorizing actions could be necessary.

requests for activities in those areas would be subject to a more rigorous review.

1.7.3 Storm Water Regulations. Section 402(p) of the Clean Water Act requires the EPA to develop a phased approach to regulating storm water discharges under the National Pollutant Discharge Elimination System (NPDES) program. EPA has established best management practices (BMPs) for controlling off-site sedimentation from construction activities. These BMPs are designed to prevent off-site sedimentation movement and erosion by protecting soils. In addition, the practices are designed to remove sediment from runoff before it is discharged from the site.

The Wyoming Department of Environmental Quality (WDEQ), Water Quality Division (WQD) is responsible for enforcing Federal storm water pollution prevention regulations. WDEQ/WQD requires a general permit for storm water discharges associated with industrial facilities and construction activities. According to WDEQ regulation "*the definition of 'construction' discharges includes any clearing, grading or excavation project which will disturb 5 or more (not necessarily contiguous) surface acres*". As explained in WDEQ storm water guidelines, operators wanting coverage under the permit must prepare a storm water pollution prevention plan as described in the *Notice of Intent for Coverage Under WDEQ General Storm Water Permit for Construction Activities*. The operator is then obligated to implement the pollution prevention plan and to perform inspections of the pollution control structures and activities weekly and whenever a storm event of 0.5 inches of precipitation or snowmelt occurs. Copies of the plan and inspection reports are to be retained in the field but do not have to be submitted to WDEQ for review and/or approval unless specifically requested to do so.

However, if Class I waters are involved (which is the case with the northwest corner of the PAPA where drainage occurs to the Green River above the confluence with the New Fork), an on-site inspection of the storm water controls by WDEQ is required. Three goals adopted by EPA and WDEQ for controlling sediment include: 1) divert upslope water around disturbed areas of the site; 2) limit the exposure of disturbed areas to the shortest duration; and, 3) remove sediment from storm water before it leaves the site.

1.7.4 Wyoming BLM Mitigation Guidelines and Practices for Surface Disturbing and Disruptive Activities. The Wyoming BLM has adopted a standard set of stipulations and conditions of approval that apply to all surface disturbing activities on Federal lands and minerals. These mitigation guidelines encompass all aspects of environmental protection and have been incorporated into both the mitigation alternatives for all activities on Federal lands and minerals. These mitigation guidelines would be imposed on Federal lands and minerals regardless of which mitigation alternative addressed in this EIS is selected. The mitigation guidelines are included in Appendix A and are discussed in more detail in Chapter 2.

1.7.5 Conformance with BLM's Pinedale Resource Management Plan. Additional drilling in the project area would not conform with the oil and gas reasonably foreseeable development impact analysis for the Pinedale RMP. The Record of Decision (ROD) for the Pinedale RMP was issued in December, 1988. At the time the ROD was issued, the BLM did not contemplate extensive development in the Pinedale Anticline area. Rather, the Draft EIS for the RMP stated "*the Pinedale Anticline contains a large gas accumulation within the Fort Union Formation, but because the rock has such low permeability, commercial production is currently marginal*" (BLM, 1986). At the time the RMP Draft EIS was prepared, 90 percent of the production in the resource area was from the Big Piney-LaBarge area in the southwest portion of Sublette County.

To estimate reasonably foreseeable development at the time the RMP was prepared, the BLM predicted that 900 additional wells would be drilled with 4,950 acres of long-term disturbance in the resource area between 1985 and 2005 (BLM, 1986). The 900 additional wells

was estimated by assuming an average of 45 wells would be drilled annually within the resource area for 20 years. Between issuance of the ROD and the end of 1998, a total of 725 wells were drilled and 2,683 acres of long-term disturbance (or 54 percent of the projected) occurred. The level of drilling activity being considered for the PAPA would exceed the level of development used by BLM to assess the reasonably foreseeable development impacts within the Pinedale Resource Area and would result in impacts beyond those addressed in BLM's 1988 RMP ROD.

Therefore, in addition to addressing project-specific impacts, this EIS will serve to update the impact analysis for reasonably foreseeable development for oil and gas drilling in the Pinedale RMP. The analysis contained in this EIS provides an evaluation of impacts associated with an increased level of cumulative development in the RMP area. Specifically, the analysis in this document provides a disclosure of the impacts of up to 700 productive well pads in the PAPA and an additional 200 wells which may be drilled elsewhere in the RMP area in the future outside of lands not currently analyzed in existing EA/EIS project areas. These impacts are evaluated and discussed in Chapter 5 of this EIS.

1.7.6 State of Wyoming Permits. Numerous permits are also required from the State of Wyoming before the operators can proceed with the project (see Table 1-3).

Department of Transportation. Transport of oversize, overweight or overlength loads (particularly drilling rigs) requires transport permits from the state (for state and Federal highways).

Oil and Gas Conservation Commission (WOGCC). In addition to the Federal APD review process, the operators must also secure approval to drill wells from the WOGCC pursuant to W.S. 30-5-101 *et seq.* This permit requirement applies to all lands within the state including Federal lands (WOGCC Rule No. 305). With the exception of certain environmental requirements (such as NEPA), the permitting process and information requirements are similar to the Federal APD process.[9]

The WOGCC has adopted minimum safety standards for oil and gas activities (Rules 320-A, 327 and 328). BLM enforces similar safety regulations. The regulations apply to general fire prevention, public protection, well operations, drilling, well servicing, production and associated facilities. WOGCC and BLM inspectors periodically inspect operations to assure compliance.

Similar to BLM's Onshore Order No. 2, the WOGCC has adopted rules to protect domestic fresh water. The WOGCC requires surface casing to a depth below all known or reasonably estimated utilizable domestic fresh water levels [Rule 320(a)]. Surface casing must be set in or through an impervious formation and must be cemented with sufficient cement to fill the annulus to the top of the hole. Rule 326 addresses pollution and surface disturbance. The regulation states that operators "*shall not pollute streams, underground water or unreasonably damage the surface of the leased premises or other lands.*"

The WOGCC permits and regulates the construction of pits located on-site. The agency prohibits the discharge or escape of fluid contents of any pit without an NPDES permit.

During scoping, several comments were received regarding impacts to residential areas. To a certain extent, the WOGCC regulates drilling and production activities in close proximity to residences. Section 22 of the WOGCC's general drilling rules state: "*Before drilling commences, approval to construct proper and adequate reserve pits for the reception and confinement of mud and cuttings and to facilitate the drilling operation shall be applied for and received in accordance with Chapter 4, Section 1. Special precautions, including but not limited to, an impermeable liner and/or membrane, monitoring systems, or closed systems, shall be taken, if necessary to prevent contamination of streams and potable water and to provide additional protection to human health and safety in instances where drilling operations are conducted in close proximity to water supplies, residences, schools, hospitals, or other structures where people are known to congregate. Pits shall be located no closer than three hundred fifty feet (350') from any of the aforementioned items. The Supervisor may impose greater distances for good cause and likewise grant exceptions to the 350-foot rule*". Further, the WOGCC rules require the operator to "*locate production tanks and/or associated production equipment no less than three hundred fifty feet (350') from any residences, schools, hospitals, or other places where people are known to congregate*".

Department of Environmental Quality. The WDEQ/WQD issues permits for and regulates off-site commercial disposal of fluids. If drilling fluids are hauled off-site for disposal at a commercial disposal facility, a permit would be required from WDEQ. In addition,

[9] Wyoming Oil and Gas Conservation Commission regulations are available at http://www.soswy.state.wy.us/rules/entity.htm

if produced water has the potential to be discharged to a water of the state, then an NPDES Individual Effluent Discharge Permit is required.

The Air Quality Division (AQD) of WDEQ issues permits to construct and operate new facilities in the State of Wyoming. According to the AQD, if any air contaminants are released into the atmosphere during the production, processing, storage, maintenance, transportation or sale of oil and gas resources, that site becomes subject to Wyoming Air Quality Standards and Regulations and the Wyoming Environmental Quality Act. Common examples of situations in which there may be releases of air contaminants at an oil and gas production facility include the following:

- nitrous oxides (NO_x) and carbon monoxide (CO) from heater treaters, line heaters, glycol dehydration reboilers and compressor engines; and
- volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) from condensate storage tanks, glycol dehydration, separator vents, blowdown and fugitive releases.

Anyone who constructs, modifies or operates a site, piece of equipment, source, facility or process which may cause or increase the emission of an air contaminate into the atmosphere must apply for a Section 21 permit. The Section 21 permitting process for wellhead emissions (excluding compression) can be streamlined for new wells, recompletion, or stimulation allowing the production rates to be established so that actual emission rates may be determined. In the streamlined process, the operator is required to submit a Notice of Installation and then calculate emissions to determine if they are a major source or if flashing, working, or standing VOC emissions exceed the WDEQ's threshold and would be required to be controlled.

A Section 30 operating permit is required if any facility (single well pad or compressor station) is considered a "major source". A major source emits more than 100 tons per year (tpy) of any regulated pollutant (NO_x, VOCs) or 10 tpy of any individual HAP (benzene, toluene, etc.) or 25 tpy or more of the total of all individual HAPs.

1.7.7 Local Permits. According to the Sublette County Planner (Garnett, 1998), two county permits apply to development in the project area. Both permits are associated with activities on county-maintained roads. The first is a permit for energy pipelines and high power transmission lines. This permit addresses pipeline crossing techniques for county roads. The second permit is typically referred to as a driveway permit. This permit allows access from driveways to county roads.

Sublette County has adopted zoning regulations. Currently, those regulations do not address oil and gas drilling and production. In the past, because interest in drilling was low, the county's Planning and Zoning Department did not require permits for drilling of the few wells that currently exist on private lands. However, now that the county may be faced with more intensive development, they believe it may be prudent to review the current development standards as they relate to future oil and gas development (Garnett, 1998).